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Workforce Aging and Firm Performance: The Moderating Effects of HRM and Organizational Culture

조직 고령화가 조직성과에 미치는 영향: 인적자원관리와 조직문화의 조절효과를 중심으로

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김 은 희

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이 논문을 경영학 석사학위논문으로 제출함

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ABSTRACTS

Workforce Aging and Firm Performance: The Moderating Effects of HRM and Organizational Culture

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Little is known about the effects of company-wide workforce aging on different firm performances, although the relationship between individual aging and job performance and between top management demography and organizational outcome is relatively well verified. Employing theories regarding abilities, motivations, and opportunities of employee, I theorized that workforce aging is positive for firm sales performance, but insignificant for firm profit performance. I also suggested that the relationship between workforce aging and firm

performance is moderated by performance-based pay system and externally oriented cultures – adhocracy and market cultures. The theoretical arguments are tested by using data from 229 Korean firms in the manufacturing sector, and the hypotheses were generally supported. The results indicate that workforce aging is an ambivalent social trend which has both of advantages and disadvantages on firms performances, and that the disadvantages can be overcome by contextual factors such as Human Resource Management (HRM) practices and organizational cultures. Future research can test the relationship between workforce aging and firm performance by using various indicators of workforce aging and organizational outcomes within different contexts.

Keyword: Workforce aging, firm performance, performance-based pay system, organizational culture

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I. INTRODUCTION

As society ages, the workforce of the world also grows older. According to international labor statistics, the proportion of aged workers has been increasing for several decades. For example, the Internal Labor Organization (ILO) suggests that the largest segment of the labor population in developed countries has changed continuously, that is, the 25–29 age cohort in 1980, the 30–34 age cohort in 1990, the 40–45 age cohort in 2000, and the 45–49 age cohort in 2010. Moreover, the Organization for Economic Cooperation and Development has projected that the increasing trend of workforce aging will further intensify in the next decades. Hence, workforce aging has become a major concern for organizations.

The changing profile of workforce age has aroused the interest of researchers in the outcome of workforce aging. Previous studies on workforce aging have excessively focused on individual outcomes. Some researchers have investigated the direct relationship between age and individual performance (e.g., Avolio, Waldman, & McDaniel, 1990; Cleveland & Shore, 1992; Czaja & Sharit, 1998; Saks & Waldman, 1998). Other researchers have verified the effects of age on cognitive abilities (e.g., Ackerman, Beier, & Boyle, 2005; Avolio & Waldman, 1990; Baltes & Lindenberger, 1997; Rhodes, 2004), work-related learning (e.g., Martocchio, 1994; Maurer, 2001; Maurer, Weiss, &

Barbeite, 2003), knowledge and skills (e.g., Colonia-Willner, 1998; Hess & Auman, 2001), job motivation (e.g., Freund, 2006; Inceoglu, Segers, & Bartram, 2012), job satisfaction (e.g., Clark, Oswald, & Warr, 1996; Gibson & Klein, 1970; Judge & Locke, 1993; Wright & Hamilton, 1978), organizational citizenship behaviors (e.g., Chattopadhyay, 1999; Wanxian & Weiwu, 2007), and counterproductive behaviors (e.g., Marcus & Schuler, 2004; Martocchio, 1989) that are important requirements for performance.

However, these previous studies on individual workforce aging have generated mixed results. The four quantitative reviews by meta-analysis show the ambiguity of the relationship between age and job performance. Waldman and Avolio (1986) reported that age is positively related with individual productivity, but negatively related with supervisor rating. McEvoy and Cascio (1989) did not find a significant relationship between age and job performance. Sturman (2003) argued that the relationship between age and job performance is an inverted-U shape. More recently, Ng and Feldman (2008) indicated that age is unrelated with core task performance.

The mixed results on the relationship between workforce aging and individual performance may be attributed to the measurement of individual performance. In the field study, objectively measuring individual job performance is difficult; hence, previous research relies

on subjective measures for individual job performance, such as self-reporting and supervisor rating. However, both methods may cause a severe bias. Supported by myriad previous studies, self-reporting methods may induce common method bias (Campbell & Fiske, 1959; Harris & Schaubroeck, 1988; Schwarz, 1999). Moreover, previous research has suggested that older employees are evaluated more severely with strict standards compared with younger employees (Cleveland & Landy, 1983; Siegel & Ghiselli, 1971). Although several age researchers have attempted to objectively measure individual performance, they focused on the labor performance of manual workers (Giniger, Dispenzieri, & Eisenberg, 1983; Salthouse, 1984) or on the productivity of professionals (e.g., academic professionals) (Oster & Hamermesh, 1998; Stewart & Sparks, 1966), which are difficult to generalize to the entire workforce in various fields.

The potential bias of individual-level research on workforce aging requires studies that examine the effects of workforce aging at the organization level. Moreover, the effects of workforce aging on individual performance may be different from the effects of company-wide workforce aging on organizational performance because organizational outcome is not the sum of individual outcomes. Therefore, workforce aging should be examined at the firm level to understand the objective effects of workforce aging on organizational

performance. Indeed, such demands have prompted researchers to explore the effects of age on organizational or group performance (e.g., Backes-Gellner, Schneider, & Veen, 2011; Backes-Gellner & Veen, 2013; Goll & Rasheed, 2005; Iacono & Weisband, 1997; Smith et al., 1994). However, the results of organization-level studies are also mixed. For example, Iacono and Weisband (1997) reported that the average age of high-performing teams is higher than that of low-performing teams. Meanwhile, Bunderson and Sutcliffe (2002) suggested that the average years of experience of top management team members are negatively associated with unit performance. Smith et al. (1994) and Goll and Rasheed (2005) could not find any relationship between the average age of top management team and firm performance.

The inconclusive results of previous research may be attributed to the fact that performance has been conceived as a one-dimensional construct. Both individual performance and organizational performance are complex concepts that consist of several dimensions (Huselid, 1995; Ng & Feldman, 2008). Age is also a composite term that includes job experience, organizational tenure, and chronological age itself. In this sense, workforce aging can be related differently with each dimension of organizational performance, which may yield the mixed results of age effects on performance.

Therefore, this study aims to verify the direct relationship

between workforce aging and organizational performance by dividing industry types and dimensions of performance. In particular, this study divides industries into high-technology and non-high-technology industries and examines the relationships between workforce aging and firm performance. This study also categorizes organizational outcomes into sales and profit performance and indicates the relationship between workforce aging and each type of organizational performance. Theoretical rationales, including human capital theory, socioemotional selectivity theory, and social capital perspectives, support that workforce aging has different effects on each type of performance because age has various aspects, and each aspect can differently influence the ability and motivation of employees as well as their opportunities. Moreover, to obtain a complete understanding of workforce aging, this study examines the moderators (i.e., organizational cultures) that can modify the influence of workforce aging on organizational performance. Guided by a competing value framework, the study hypothesizes that organizational cultures can reinforce or attenuate the effect of workforce aging on organizational performance.

II. THEORIES AND HYPOTHESES

1. Workforce Aging and Organizational Performance

Several theoretical perspectives have been proposed to explain the relationship between age and performance. Most of these theoretical treatments focus on the human capital of an aging workforce. The aging workforce is a double-edged sword with regard to the abilities of employees; it exerts both negative and positive effects on employee ability. There has long been a view of negative relationships between age and ability (Rhodes, 1983). The decremental theory of aging suggests that aging significantly decreases physical abilities, such as motor coordination, action speed, and muscular strength (Avolio & Waldman, 1994; Giniger et al., 1983; Salthouse, 1984). Aging also reduces mental abilities, including cognitive functioning and memory capacity (Henry, MacLeod, Phillips, & Crawford, 2004; Rhodes, 2004). By contrast, one rationale for the hypothesized positive relationship between age and ability indicates that older employees have job experience and expertise. Both human capital theory and learning theory state that job experience enhances the ability, and thus, performance of employees (Avolio & Waldman, 1990; Ehrenberg & Smith, 1985; Weiss, 1990). Specifically, job experience increases the job- or firm-specific knowledge and skills of employees, which, in turn, improve job performance (Niessen, Swarowsky, & Leiz, 2010).

The theory of fluid and crystallized intelligence by Cattell (1963) similarly supports the ambivalent effects of age on ability. According to this theory, fluid intellectual abilities are related with general abilities for novel information processing, logical reasoning, and working memory, whereas crystallized intellectual abilities are more associated with specific experiences or education (Cattell, 1987). Thus, fluid intellectual abilities are relatively well manifested in tests of general mental abilities compared with crystallized intellectual abilities (Ackerman, 1996). On the basis of this concept of intellectual abilities, Kanfer and Ackerman (2004) argued that fluid intellectual abilities gradually decline, whereas crystallized intellectual abilities increase over a life span. Kanfer and Ackerman (2004) also contended that increased crystallized intellectual abilities may compensate for a decline in fluid intellectual abilities, especially in jobs that require a high level of job-specific knowledge or experiences.

This proposition has been supported by several empirical or experimental studies. For example, Giniger et al. (1983) revealed that older workers in the garment industry showed higher productivity and experienced lower accidents than younger workers, contrary to their predictions based on the decremental theory of aging. They explained that the job under the study does not require the physical ability to the limits of workers; thus, competence and job experience compensate for

the decreased physical ability of older workers. Schmidt, Hunter, and Outerbridge (1986) argued that although mental and cognitive abilities improve learning speed, job experience provides opportunities for knowledge acquisition, utilization, and optimization. They also empirically demonstrated that both job experience and general mental ability are highly and independently related with job knowledge and work performance. Artistico, Cervone, and Pezzuti (2003) showed in their experimental research that older adults performed better and exhibited higher self-efficacy in problem solving when the problems were familiar and encountered frequently.

Aging may also affect job attitudes ambivalently. According to socioemotional selectivity theory that was proposed by Carstensen (1992), motives change along with the times. Younger adults increasingly emphasize the time spent from birth and tend to seek future opportunities. Consequently, younger employees will be more motivated to learn and respond more sensitively to potential opportunities (Kanfer & Ackerman, 2004). By contrast, older adults are more focused on the time left until death; hence, their motives shift to supporting identity, finding meaning in their job, and obtaining affective rewards (Kanfer & Ackerman, 2004; Ng & Feldman, 2010). Therefore, older employees tend to have high organizational commitment and job involvement (Ng & Feldman, 2010).

Socioemotional selectivity theory also states that older adults intend to have positive emotional experiences, rarely express their negative emotions (Gross et al., 1997), recall positive information (Levine & Bluck, 1997), which, in turn, increase the favorability of job attitudes. Moreover, older employees are likely to have more satisfactory jobs because they already experienced the life-long process of job selection (Wright & Hamilton, 1978). In sum, aging can affect job attitudes in that job- or task-related motivation and job satisfaction increase, whereas learning-related motivation decrease, as individuals grow older.

Kooij, De Lange, Jansen, Kanfer, and Dikkers (2011) supported this proposition and indicated that age is negatively related with extrinsic motives and learning motivations, but positively related with intrinsic motives, except motivations for learning. Moreover, Inceoglu et al. (2012) empirically demonstrated that older employees are less motivated by extrinsic value, but more motivated by the intrinsic value of their jobs. A few review studies also revealed a similar relationship between age and job attitudes. Rhodes (1983) qualitatively examined the effects of age on a variety of job attitudes. In his comprehensive review, Rhodes (1983) concluded that age is positively associated with overall job satisfaction, satisfaction with work itself, job involvement, and job motivation. For satisfaction with pay, with promotion, with coworkers, and with supervision, mixed

results were observed. Ng and Feldman (2010) provided a meta-analysis of the relationship between age and job attitudes. Results of the meta-analysis similarly suggested that older employees are more likely to have favorable job attitudes, such as overall job satisfaction, satisfaction with work itself, intrinsic job motivation, job involvement, organizational commitment, organizational identification, and loyalty. Older employees are also less likely to have negative job attitudes, such as role overload, role conflict, and interpersonal conflict.

In addition, employees have different opportunities for achieving performance as they grow older. In terms of learning and training, older employees may have fewer chances due to the negative stereotypes on age (Rosen & Jerdee, 1976). Older employees are generally assumed to be resistant to change, inferior for learning new knowledge, and provide a lower return on investment (ROI) on training (Posthuma & Campion, 2008). According to Weiss and Maurer (2004), for example, managers believe that older employees are more likely to be less flexible and more resistant to change than younger employees. Numerous studies also indicated that older employees are rated as having less learning abilities and potential for development (e.g., Avolio & Barrett, 1987; Brooke & Taylor, 2005; Dedrick & Dobbins, 1991). Moreover, given that older employees are considered to have less time in their careers and lower ROI, managers and firms prefer to

train younger employees (Hutchens, 1993). Previous research also described the negative effects of the stereotypes. Rosen and Jerdee (1977) argued that older employees tend to have less developmental feedback, and training funds are less likely to be allocated to them.

Although older employees may have fewer opportunities for development than younger employees, they can obtain valuable information and resources by exploiting their social capital. With longer careers and histories of interaction, older employees may have numerous, diverse, and unique network links to individuals within and across organizational and functional boundaries (Ng & Feldman, 2013). In general, larger and more diverse networks have greater information and resource capacities than smaller and more homogeneous networks. Relationships with external contacts can provide multiple perspectives and ways of thinking (Constant, Sproull, & Kiesler, 1996). Employees with a wide perspective can embrace diverse values from various knowledge sources, and their various points of view enable employees to recognize valuable knowledge and information from such external sources. Moreover, older employees may have more contacts at higher organizational levels that are important providers of high-value resources and knowledge. Ideally, workers in higher positions have broader perspectives, greater decision-making authority, and more control over valuable resources than those in lower positions (March &

Simon, 1958; Thompson, 1967). Based on their greater experience and judgment, older employees can recognize realizable ideas and facilitate the implementation of creative concepts (Unsworth & Clegg, 2010; van Veldhoven & Dorenbosch, 2008).

We can investigate the complex relationship between workforce aging and organizational performance by decomposing firm performance into two dimensions: sales performance and profit performance. For sales performance or productivity, theoretical rationales indicate that workforce aging has numerous advantages that may offset the disadvantages. Sales performance can reflect the productivity of a firm generated by the workforce regardless of the cost. Although reduced cognitive abilities of workforce aging can deter the acquisition of new knowledge, the increased firm-specific human capital and specialized skills help to improve the efficiency of task processes. Moreover, older employees tend to have favorable work attitudes such as organizational commitment and job involvement, which motivate them to use their valuable knowledge and skills for the firm. Older employees are satisfied with their job, firm, and coworkers, so they tend to be supportive and cooperative (Ng & Feldman, 2010). The favorable job attitudes of older employees can also prevent counterproductive behaviors such as absenteeism and workplace aggression (Martocchio, 1989). Even the low desire for future

opportunities of older employees may be beneficial for firm productivity because it can prevent voluntary turnovers that have negative effects on firm productivity. Because older employees tend to form strong relationships, they can communicate with their coworkers, transfer their tacit knowledge, and form trust more effectively, which can lead to productive work processes.

However, the negative effect of workforce aging is magnified when I consider the labor cost and regard firm profitability as the outcome. In many cases, older employees obtain a higher level of pay than younger employees (Barth, 1997), and the pay level of the former can be sufficiently excessive to surpass their productivity. Efficient wage model of the labor market explain the disconnection between productivity and earnings (Akerlof & Yellen, 1986). According to this model, employers create earning differentials over time, which do not correspond to productivity profiles to provide incentives for employees to remain with the firm. Therefore, younger employees are paid less than their value added, whereas older employees receive pay that is higher than their value added during the later years of employment. Theoretical rationale suggests that the negative effect of age on job performance resides in the productivity growth rate rather than employee productivity itself. The relatively lower cognition abilities of older employees reduce their capacity to absorb new information,

knowledge, or skill compared with younger employees when the same learning opportunities are provided. Moreover, older employees need not learn something entirely new because they tend to consider that focusing on the present job is more important than creating new possibilities for success. Fewer learning opportunities are also provided to older employees than to younger employees because of the negative stereotype on age (i.e., training older employees is inefficient) (Posthuma & Campion, 2008). The characteristics of the social network of older employees are also ineffective for learning; the knowledge and information shared within close relationships may be more redundant and superfluous. Therefore, the high level of workforce aging can be a financial burden for a firm, which may reduce its profit. Thus, the following hypothesis is presented:

Hypothesis 1: Workforce aging is more positively related with sales performance than profit performance.

2. Moderating effect: HRM practices and organizational cultures

Prior research on aging and learning supports that if older individuals are given to have motivations and opportunities for learning and training, their learning effectiveness can be increased even to the level similar with that of younger individuals. For example, Basak,

Boot, Voss, and Kramer (2008) prove that older adults are improved significantly in cognitive abilities such as working memory, task switching, reasoning and visual short-term memory after training. Buschkuehl et al. (2008) also found the training effect on memory performance of older adults; trained individuals are generally improved in their memory performance, especially in visual working memory performance and episodic memory. Beier and Ackerman (2005), using a sample of 199 adults whose age is ranged from 19 to 68 years, verified that prior knowledge was an important predictors of knowledge acquisition for learning, and that prior knowledge was positively related with age, crystallized intelligence, and prior experience. These results of prior studies indicate that the low cognitive abilities of older adults can be overcome by motivating them and providing more learning opportunities, and that even older adults have the merit of learning – prior knowledge and experience.

HRM practices can provide employees with abilities, motivations, and opportunities to engage in desired behaviors for individual and organizational performance (Batt, 2002). In this sense, HRM practices, especially performance-based reward practices can play important roles to complement the disadvantages of workforce aging – low level of learning motivations. Pay is significant components of workplace motivation and performance (Lawler, 1971).

In seniority-based pay system in which employee performance is separated from reward, employees may not be motivated to learn because they can get higher salaries as time goes by. In this system, older employees are more likely to be lazy for learning because they already get high level of pay due to their long tenure and career history. On the other hand, when their performance is linked to appraisal and pay level, even older employees will strive to increase their productivity to get higher salaries and better evaluation in their workplace. Thus, the increased motivation for learning and developing by HRM practices can promote the productivity of older employees and complement the negative effects of workforce aging. Therefore, I propose the following hypotheses:

> *Hypothesis 2: Performance-based pay practices positively moderates the relationship between workforce aging and firm performance such that the relationship is stronger in organizations with performance-based pay practices.*

This study also considers organizational culture as a possible moderator of the relationship between workforce aging and firm performance because it can change the motivations and opportunities of employees. Pettigrew (1979) introduced organizational culture;

research on this topic has since progressed in various directions. Organizational culture pertains to a set of ideological principles and philosophical guidelines for behaviors (Schein, 1990), traditional norms about the values of behaviors in an organization (Ouchi & Wilkins, 1985), and basic assumptions for the organizational system (Denison, 1990). Therefore, organizational culture is a complex concept that includes behavioral norms and principles based on the shared values, beliefs, ideologies, and traditions of an organization (Hofstede, 2001). Moreover, little consensus exists concerning the types of organizational culture due to the complexity of this concept. For example, Deal and Kennedy (1982) suggested four types of organizational cultures (i.e. tough guy/macho, work hard/play hard, bet your company, process cultures) based on the level and frequency of feedback and risk avoidance. Wallach (1983) categorized organizational cultures into bureaucratic, innovative, and supportive cultures based on previous empirical studies. Hofstede, Neuijen, Ohayv, and Sanders (1990) performed factor analysis in classifying organizational culture on the basis of six standards, namely, results orientation, job orientation, professional, closed system, tight control, tight control, and pragmatic cultures.

Among the multiple conceptualizations, I adopted the competing value framework for organizational cultures that was

proposed by Quinn and Rohrbaugh (1981) because it is widely used in research and has been considered to have theoretical and empirical validity (Gregory, Harris, Armenakis, & Shook, 2009; Hartnell, Ou, & Kinicki, 2011). Competing value framework indicates the differences of organizational cultures and values along two dimensions, namely, focus and structure. The focus dimension ranges from external focus and differentiation to internal focus and integration; meanwhile, the structure dimension ranges from flexibility and discretion to stability and control. Based on this framework, organizational culture is classified into four types, namely, adhocracy, market, clan, and hierarchy cultures.

Adhocracy culture is identified with an external orientation and a flexible structure. It fundamentally assumes that innovativeness and new resources induce organizational effectiveness. This type of culture is characterized by several values, such as innovative outputs, transformation, and agility (Cameron & Quinn, 2011). Organizations with an adhocracy culture commonly have decentralized structures, temporal and autonomous work teams, and intensive training programs; moreover, their employees are encouraged to seek creative solutions and continuously improve existing processes (Denison & Spreitzer, 1991).

Market culture is externally oriented and sustained by a stable

control structure. The management in a market-type firm assumes that aggressive competition and customer orientation are the keys to success. Market share, goal achievement, and profitability are considered the core values of a market culture (Cameron & Quinn, 2011). Market-type firms are likely to have reward and promotion systems that are based on individual performance, functional structures, and management by objective programs. Employees tend to undergo the rational decision-making process and work with feasible plans and within tight schedules (Denison & Spreitzer, 1991).

Clan culture emphasizes an internal orientation and a flexible structure. It principally assumes that organizational effectiveness is realized by human development and participation. The core values of a clan culture are commitment and communication (Cameron & Quinn, 2011). The typical characteristics of clan-type firms are employee involvement programs, group-based rewards, semi-autonomous work teams, and low turnover rates. Employees in clan cultures trust each other, feel a strong sense of belonging, and cooperate with others (Denison & Spreitzer, 1991).

Hierarchy culture strongly emphasizes an internal orientation and a control structure. It primarily assumes that control and efficiency with standardized processes organizational effectiveness. Efficiency, timeliness, consistency, and uniformity are the core values of a

hierarchy culture (Cameron & Quinn, 2011). Hierarchy-type firms have common features, such as clear lines of decision making, standardized task designs, seniority-based reward and pay systems, and vertical organization structures. Managers in hierarchy-type firms commonly coordinate the work and monitor their employees; thus, employees typically do one specific job without their own discretion and clearly recognize their role and responsibility (Denison & Spreitzer, 1991).

I contend that the negative relationship between workforce aging and organizational performance can be moderated by organizational culture. Specifically, adhocracy and market cultures may increase the positive effect of workforce aging on the productivity of firms, and thus, decrease the negative effect of workforce aging on their profitability. As previously discussed, an important rationale for the negative relationship between workforce aging and firm performance is that labor costs increase more rapidly than the productivity of aged workers; the rate of productivity increase is reduced over time. Older employees have lower motivations and cognitive abilities for learning (Kanfer & Ackerman, 2004). Moreover, older employees are likely to have less learning opportunities than younger employees because of the negative stereotype on age and the characteristics of their networks. The low level of abilities, motivations, and opportunities for learning decelerates productivity increase and decreases the profits of the firm.

Externally oriented organizational cultures (i.e., adhocracy and market cultures) can prevent older employees from becoming poor learners by motivating them to learn and providing learning opportunities. Firms with an adhocracy culture emphasize creativity, encourage the continuous improvement of employees, and provide intensive training programs (Cameron & Quinn, 2011). Thus, employees in firms with an adhocracy culture regard learning as being important and natural, regardless of age. The high degree of learning motivation of employees allows them to identify more opportunities to improve themselves, which promotes synergy with the actual training opportunities provided by adhocracy-type firms. Market culture similarly encourages the learning of older employees. Firms with a market culture highlight the importance of competition to gain profit under harsh market conditions (Cameron, 2006). Employers commonly apply results-oriented management practices, such as performance-based salary and promotion systems and dismissal for poor performance (Cameron & Quinn, 2011). Older employees view turnover as costs and risks that they should avoid; at the same time, they exhibit a strong desire to remain in their present organization. Thus, older employees in firms with a market culture are pressured to achieve stretching goals. Naturally, older employees in market-type firms can be motivated to improve themselves by learning, which

increases the growth rate of their productivity. Regardless of the cultural pressure or support, younger employees fundamentally have a strong desire to learn and to obtain potential opportunities. By contrast, older employees generally have a lower motivation and fewer opportunities for learning compared with younger employees. Thus, when older employees are stimulated by the environment and have opportunities to learn, the effect of learning can be more pronounced compared with younger employees.

Meanwhile, internal oriented cultures (i.e., clan and hierarchy cultures) may not complement the disadvantages of workforce aging and even the advantages can overlap. For example, in a firm with clan culture, organizational commitments and strong relationships among employees are emphasized. Clan cultures also feature a family-like workplace and low turnover rate, which are dominant traits of older employees. Moreover, hierarchy cultures also have overlapping characteristics with workforce aging such as efficiency-focused system and climate of safety. Due to the stable climate, older employees' low motivation for learning can decrease with the hierarchy culture than without it. In this sense, internal oriented cultures may not increase the positive effects of workforce aging on firm performance.

An opposite explanation may support the negative moderating

effect of externally oriented cultures on the relationship between workforce aging and firm performance. Specifically, older employees tend to perceive a mismatch between their values and the core values of the firm. Based on the perspective of person–organization fit, the perceived discordance of values can discourage employees from working, which increases their turnover intention, and accordingly, decreases organizational performance (O'Reilly, Chatman, & Caldwell, 1991). However, the turnover scenario of person–organization fit seems to be rarely applied to older employees; the discordance of values will not significantly affect the turnover of older employees. The basic and established assumption of age is that older individuals consider their time and energy to be limited (Carstensen, 1992). For older employees, turnover means spending their limited time and energy for uncertain changes that may even worsen the situation. Therefore, although older employees perceive the difference in values in an organization, they are more likely to accept and adapt to the organizational values than to avoid and leave the organization. Therefore, I propose the following hypothesis:

> *Hypothesis 3: Adhocracy cultures positively moderates the relationship between workforce aging and firm performance such that the relationship is stronger when adhocracy culture is*

high.

Hypothesis 4: Market cultures positively moderates the relationship between workforce aging and firm performance such that the relationship is stronger when market culture is high.

III. METHOD

1. Data and Sample

I used a national survey dataset in South Korea called the Human Capital Corporate Panel (HCCP) for this study. A government-funded agency called the Korean Research Institute for Vocational Education and Training (KRIVET) has collected the data since 2005. By using stratified random sampling methods, KRIVET distributed the survey to 1,899 companies listed on the Korean Securities Dealers Automated Quotations and that had more than 100 employees. I only used the fourth-round data (2011) from among the multiyear dataset because other datasets do not have complete survey items for organizational cultures. The initial HCCP data were constructed from surveys returned by 500 firms and 10,064 employees. To rule out the industrial effect on performance, I only included the data surveyed from 368 firms in the manufacturing sector.

The HCCP survey data include multiple sets of questionnaires.

One set of questionnaires was answered by HR executives to obtain information on employment status and human resource management. Employees of each company completed a different set of questionnaires designed to collect data on demography, job attitudes, and perception on organizational characteristics including organizational cultures. All survey measures in HCCP's 2011 survey referred to the 2010 calendar year. As my research model was designed at the organizational level, I aggregated the data answered by employees. For the dependent variables, the HCCP survey data were matched with the financial statement data from the Korea Investor Service's (KIS) database with a one-year time lag. In other words, I used the HCCP's 2011 survey, which referred to the 2010 calendar year, for the independent variables, and the KIS's 2011 database, which presented the financial statements of the 2011 calendar year, for the dependent variables. After eliminating incomplete cases and obvious outliers, the final sample contained 230 firms. No significant differences were found between the selected and the excluded firms in terms of firm size, degree of workforce aging, firm performance, and organizational cultures.

2. Measures

Organizational performance

Following prior research (e.g., Datta, Guthrie, & Wright, 2005;

Guest, Michie, Conway, & Sheehan, 2003; Guthrie, 2001; Huselid, 1995), I measured sales performance as the logarithm of sales per employee, and profit performance as the logarithm of net profit per employee. Organizational performance data were obtained from KIS. Although these measures, especially sales per employees, are widely used, they are not without limitation as they cannot reflect the values perceived by the capital and product markets. However, these measures are closely related to employee efforts that are separable from the variations in the capital and product markets (Huselid, 1995). Therefore, they are much powerful measures for my model that indicates the relationship between employee characteristics and firm performance.

Workforce aging

Workforce aging was measured by both the percentage of employees aged 40 years or older and the percentage of employees aged 50 years or older. However, until now, the literature does not have a clear consensus on who are considered “older” employees. Recently, Ng and Feldman (2008) defined older workers as those who are aged 40 or older according to the U.S. Age Discrimination in Employment Act of 1967 (ADEA), the previous meta-analyses on age in the applied psychology literature, and the results of career research. Therefore, following Ng and Feldman (2008), I adopted employees aged 40 or older as the definition of older employees. Moreover, I measured

workforce aging by the percentage of employees aged 50 years or older. One major reason for this is that defining older employees as those aged 40 or older may be impractical in the present situation. According to the Internal Labor Organization (ILO), the largest segment of labor population in developed countries is the 45 to 49 age cohort. If only the age-40 cutoff was used for the index of workforce aging, the mean of the whole working population would be considered "old." Therefore, I used both the age-40 and age-50 cutoffs as the indicators of organizational workforce aging.

Performance-based pay system

HR executive of each organization answered the survey items for performance-based pay system. Consistent with prior research (e.g., Bloom & Milkovich, 1998; Milkovich, Newman, Milkovich, & Mirror, 1999), I defined performance-based pay by the proportion of pay that is dependent on individual, group, and firm performance, and is not added to base pay. In other words, performance-based pay system is measured by the ratio of performance-based pay to base pay. Additionally, I also use the number of performance-based pay forms (i.e., individual incentive, team incentive, department incentive, profit sharing, and gain sharing) which are applied in an organization as another measure of performance-based pay system.

Organizational cultures

For organizational cultures, I used a measure consistent with the previous literature. Zammuto and Krakower (1991) developed and examined a survey instrument of competing value profiles for individual organizations. The instrument consists of four survey items for each type of organizational culture, and each question indicates one of the four value systems: institutional character, institutional cohesion, institutional emphasis, and institutional leadership. Among these systems, I consider the first three to be the core value systems of organizational cultures as the leaders' characteristics are considered the predictor of organizational cultures rather than the core value of cultures in previous literature (e.g., Bass & Avolio, 1993; Kavanagh & Ashkanasy, 2006; Ogbonna & Harris, 2000). On the basis of the three core value systems, I extracted three survey items for each organizational culture. The survey items for adhocracy cultures include "The company encourages changes and new initiatives," "The company gives a reward for innovative activity," and "Creativity is considered more valuable than conscientiousness in the company." The survey items for market cultures include "The company emphasizes competition and achievement," "Expertise and abilities are important in the company," and "The company emphasizes job-performing ability and performance record." The survey items for clan cultures include "The company is a lot like an extended family," "The company

emphasizes solidarity and sense of unity," and "Team work and cohesion is considered valuable." The survey items for hierarchy cultures include "Formal rules, policies, and procedures are important in the company," "The company's procedure for communication and information is a top-down method," and "The company emphasizes the sense of hierarchy." A five-point response scale from 1 (almost none) to 5 (very much) was used for these questions. The three items for each organizational culture were averaged to create a scale score for each culture type. The Cronbach's alpha for organizational cultures was 0.83 for adhocracy, 0.77 for market, 0.87 for clan, and 0.61 for hierarchy cultures. Then, I aggregated the employee data to create a company-level variable. To ensure the adequacy of data aggregation, I assessed the inter-rater agreement on each culture variable by calculating r_{wg} (James, Demaree, & Wolf, 1984). The average r_{wg} was 0.85 for adhocracy, 0.84 for market, 0.86 for clan, and 0.88 for hierarchy culture. These values of r_{wg} were well above the recommended minimum value of 0.70 (Klein & Kozlowski, 2000).

Control variables

I controlled for firm characteristics that could influence the dynamics of my variables. First, I controlled for firm characteristics including firm size which was measured by the total number of employees and firm age which was computed as the number of years

since the company was established. Second, I also controlled the market strategy of a firm, because the strategy of firms with many older employees may be different with that of other firms. Third, I controlled other organizational compositions such as the ratio of female employees, part-time employees, and white-color employees. The percentage of female employees was controlled as gender was commonly studied as a control variable in previous research on aging (Ng & Feldman, 2008). The percentage of part-time employees could be related to both organizational cultures and performance. And, a firm with high ratio of older employees may have higher or lower ratio of white-color employees. Forth, market demand change which is measured by the market demand change for dominant product of the firm is controlled because market condition is critical for organizational performance. Lastly, I controlled for the presence of unions because they traditionally play a significant role in organizational performance and organizational cultures (Tang, Kim, & O'Donald, 2000).

IV. RESULTS

Table 1 presents the means, standard deviations, and zero-order correlations of all the study variables. Consistent with previous studies (e.g., Cameron, 1986; Miron, Erez, & Naveh, 2004), the four types of cultures have a positive and significant correlation rather than contradict each other. One of the underlying assumptions of the competing value model is that four cultures should be considered as ideal types and organizations can reflect more than one type of cultures (Cameron & Quinn, 2011; Denison & Spreitzer, 1991). As the variables of the four cultures were measured using the same source of information, a confirmatory factor analysis was conducted to ensure the distinctiveness of variables for organizational cultures. On the basis of the correlation between each type of culture, I compared my four-factor model (consisting of adhocracy, market, clan, and hierarchy cultures) with the three-factor (consisting of externally oriented cultures, clan, and hierarchy), two-factor (consisting of externally oriented and internally oriented cultures), and one-factor models (common source). I found that the four-factor model (χ^2= 3751.58, goodness-of-fit index [GFI] = .94, normed fit index [NFI] = .93, comparative fit index [CFI] = .94, root mean squared error of approximation [RMSEA] = .08) has a better fit for the data than the

TABLE 1

Descriptive Statistics and Correlations [a]

	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	12	13	14	15	16	17	18
1. Sales per Employee[b]	13.06	0.65																	
2. Net-profit per Employee [b]	11.24	0.79	0.18***																
3. Age 40 ratio	0.40	0.19	0.19***	-0.07															
4. Age 50 ratio	0.13	0.10	0.13*	0.00	0.75***														
5. Adhocracy culture	3.32	0.35	0.17**	0.21***	-0.09	-0.15*													
6. Market culture	3.55	0.33	0.13*	0.18**	-0.10	-0.14*	0.76***												
7. Clan culture	3.51	0.24	0.20***	0.09	0.05	-0.04	0.64***	0.67***											
8. Hierarchy culture	3.50	0.31	0.11	0.09	0.08	0.03	0.42***	0.64***	0.52***										
9. PFP numbers	1.42	1.14	0.06	0.08	-0.19***	-0.18**	0.22***	0.24***	0.12*	0.05									
10. PFP ratio	510.02	350.18	0.24**	0.19**	0.11*	0.04	0.19**	0.20**	0.21**	0.29***	0.12*								
12. Firm Size(a)	5.90	1.03	0.29***	0.14*	-0.02	-0.08	0.27***	0.34***	0.35***	0.24***	0.19***	0.31***							
13. Firm Age(a)	3.35	0.57	0.11*	0.10	0.31***	0.32***	0.02	0.02	0.10	0.23***	0.06	0.20***	0.17***						
14. Part-time ratio	0.06	0.11	0.08	0.13*	-0.10	-0.05	0.09	0.07	0.02	-0.02	0.09	0.10	0.24***	-0.02					
15. Female ratio	0.20	0.18	-0.35***	-0.19***	-0.05	-0.07	-0.03	-0.03	-0.03	-0.06	0.01	-0.19**	-0.06	-0.14**	-0.02				
16. Unionization	0.93	0.26	0.06	0.03	0.10*	0.09	-0.03	0.01	0.08	-0.05	0.06	0.11*	0.19***	0.14**	0.05	-0.06			
17. White color ratio	0.49	0.21	-0.01	0.03	-0.27***	-0.16**	0.09	0.15*	0.08	0.13*	0.12*	-0.12*	-0.12*	0.11*	0.04	-0.20***	-0.04		
18. Strategy	2.01	0.74	0.01	0.13*	-0.11*	-0.04	0.26***	0.25***	0.16**	0.09	0.06	0.01	0.13*	0.04	0.04	-0.06	-0.07	0.16**	
19. Demand change	3.33	1.01	0.08	0.11*	-0.08	-0.05	0.18**	0.13*	0.09	0.02	0.01	0.08	0.10	-0.10	0.18***	-0.02	0.04	-0.02	0.09

[a] n=229; [b] logarithm; † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

three-factor (χ^2= 6782.80, goodness-of-fit index [GFI] = .88, normed fit index [NFI] = .88, comparative fit index [CFI] = .86, root mean squared error of approximation [RMSEA] = .12), two-factor (χ^2= 8010.63, goodness-of-fit index [GFI] = .86, normed fit index [NFI] = .86, comparative fit index [CFI] = .86, root mean squared error of approximation [RMSEA] = .12), and one-factor (χ^2= 12350.08, goodness-of-fit index [GFI] = .80, normed fit index [NFI] = .78, comparative fit index [CFI] = .78, root mean squared error of approximation [RMSEA] = .15) model. This finding justifies my treatment of organizational cultures as four distinct variables, namely, adhocracy, market, clan, and hierarchy cultures.

To test Hypotheses 1 to 4, hierarchical ordinary least squares regression analyses were used. Hypothesis 1 suggests that workforce aging is more positively related with sales performance than profit performance. Tables 2 and 3 show the results of sales performance, and Tables 4 and 5 show the results of profit performance. The results in Tables 2 and 3 indicate a positive association between workforce aging and sales performance (β = .19, p < .01 in Table 2 (Age 40 cutoff), β = .13, p < .05 in Table 3 (Age 50 cutoff)). Regardless of the age standard, firm sales performance increases as the percentage of older employees rises.

TABLE 2

Workforce aging (Age 40) and Sales Performance: Moderation of HRM and Organizational Culture

Variable	1	2	3	4	5	6	7	8	9
Firm size	0.23***	0.26***	0.22***	0.22***	0.22***	0.22***	0.23***	0.23***	0.23***
Firm age	0.02	-0.03	-0.05	-0.05	-0.09	-0.09	-0.09	-0.09	-0.09
Part-time ratio	0.03	0.03	0.04	0.04	0.04	0.05	0.04	0.05	0.04
Female ratio	-0.33***	-0.33***	-0.31***	-0.31***	-0.32***	-0.32***	-0.32***	-0.32***	-0.32***
Unionization	-0.02	-0.03	-0.03	-0.05	-0.01	-0.02	-0.02	-0.03	-0.02
White color ratio	-0.02	0.04	0.05	0.04	0.13*	0.13*	0.13†	0.13*	0.13*
Strategy	-0.04	-0.03	-0.03	-0.04	-0.07	-0.07	-0.07	-0.07	-0.07
Demand change	0.06	0.06	0.07	0.05	0.04	0.04	0.04	0.04	0.04
Workforce aging		0.19**	0.20**	0.19**	0.28***	0.28***	0.28***	0.28***	0.27***
HRM									
PFP practices			0.02	0.02					
PFP ratio			0.13*	0.14*					
Organizational culture									
Adhocracy					0.18*	0.18†	0.15†	0.16†	0.17†
Market					-0.12	-0.13	-0.11	-0.11	-0.12
Clan					0.11	0.09	0.11	0.11	0.10
Hierarchy					0.02	0.01	0.01	0.01	0.02
Two-way interaction									
Workforce aging x PFP numbers				0.03					
Workforce aging x PFP ratio				0.04					
Workforce aging x Adhocracy						0.05			
Workforce aging x Market							0.05		
Workforce aging x Clan								0.06	
Workforce aging x Hierarchy									0.03
R2	0.19	0.22	0.24	0.27	0.25	0.25	0.25	0.25	0.25
∆R2	0.19	0.03	0.02	0.03	0.03	0.00	0.00	0.00	0.00
F for ∆R2	8.56***	9.94**	2.19†	3.79**	2.08†	0.72	0.40	0.27	0.29

[a] n=229; [b] logarithm; † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

TABLE 3

Workforce aging (Age 50) and Sales Performance: Moderation of HRM and Organizational Culture

Variable	1	2	3	4	5	6	7	8	9
Firm size	0.23***	0.29***	0.22***	0.20***	0.21***	0.22***	0.23***	0.23***	0.23***
Firm age	0.02	-0.03	-0.01	0.00	-0.03	-0.09	-0.09	-0.09	-0.09
Part-time ratio	0.03	0.03	0.02	0.03	0.02	0.05	0.04	0.05	0.04
Female ratio	-0.33***	-0.33***	-0.32***	-0.31***	-0.34***	-0.32***	-0.32***	-0.32***	-0.32***
Unionization	-0.02	-0.03	0.04	-0.03	-0.02	-0.02	-0.02	-0.03	-0.02
White color ratio	-0.02	0.04	0.04	0.04	0.09*	0.13*	0.13†	0.13*	0.13*
Strategy	-0.04	-0.03	-0.06	-0.07	-0.10	-0.07	-0.07	-0.07	-0.07
Demand change	0.06	0.06	0.06	0.05	0.04	0.04	0.04	0.04	0.04
Workforce aging		0.13*	0.14*	0.16*	0.18**	0.28***	0.28***	0.28***	0.27***
HRM									
PFP practices			0.01	0.01					
PFP ratio			0.13*	0.15*					
Organizational culture									
Adhocracy					0.19*	0.18†	0.18†	0.17†	0.17†
Market					-0.13	-0.13	-0.12	-0.11	-0.12
Clan					0.13	0.13	0.11	0.12	0.11
Hierarchy					0.02	0.01	0.01	0.01	0.01
Two-way interaction									
Workforce aging x PFP practices				0.12*					
Workforce aging x PFP ratio				-0.02					
Workforce aging x Adhocracy						0.10			
Workforce aging x Market							0.09		
Workforce aging x Clan								0.07	
Workforce aging x Hierarchy									0.03
R2	0.19	0.20	0.22	0.25	0.23	0.23	0.23	0.23	0.23
ΔR2	0.19	0.01	0.02	0.03	0.03	0.01	0.01	0.00	0.00
F for ΔR2	8.56***	5.72*	1.97†	3.50*	2.75*	2.32	2.06	1.17	0.00

[a] n=229; [b] logarithm; † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

TABLE 4

Workforce aging (Age 40) and Profit Performance: Moderation of HRM and Organizational Culture

Variable	1	2	3	4	5	6	7	8	9
Firm size	0.09	0.06	0.01	0.01	0.02	0.03	0.03	0.03	0.04
Firm age	0.07	0.11	0.09	0.10	-0.00	-0.01	-0.00	-0.01	0.00
Part-time ratio	0.10†	0.10†	0.10†	0.09	0.14*	0.14*	0.14*	0.14*	0.13*
Female ratio	-0.17**	-0.18**	-0.16**	-0.15**	-0.20**	-0.20**	-0.20**	-0.20**	-0.21**
Unionization	-0.01	0.00	-0.01	-0.00	0.08	0.08	0.08	0.07	0.07
White color ratio	-0.02	-0.05	-0.03	-0.04	-0.02	-0.03	-0.02	-0.02	-0.02
Strategy	0.10†	0.10†	0.09	0.09	0.12†	0.12†	0.12†	0.12†	0.12†
Demand change	0.07	0.07	0.06	0.06	0.17**	0.16*	0.17**	0.17**	0.18**
Workforce aging		-0.11†	-0.11†	-0.10	-0.09	-0.09	-0.10	-0.09	-0.10
HRM									
PFP practices			0.03	0.05					
PFP ratio			0.12†	0.12*					
Organizational culture									
Adhocracy					0.15	0.12	0.09	0.13	0.14
Market					0.01	-0.01	0.04	0.02	0.01
Clan					-0.10	-0.10	-0.10	-0.09	-0.12
Hierarchy					0.09	0.09	0.07	0.08	0.09
Two-way interaction									
Workforce aging x PFP practices				0.07					
Workforce aging x PFP ratio				0.02					
Workforce aging x Adhocracy						0.17**			
Workforce aging x Market							0.13*		
Workforce aging x Clan								0.07	
Workforce aging x Hierarchy									0.09
R2	0.08	0.09	0.10	0.10	0.10	0.13	0.11	0.10	0.11
∆R2	0.09	0.01	0.01	0.00	0.02	0.03	0.01	0.00	0.01
F for ∆R2	3.53**	2.95†	1.36	0.56	1.54	7.41**	4.06*	1.18	2.05

[a] n=229; [b] logarithm; † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

TABLE 5

Workforce aging (Age 50) and Profit Performance: Moderation of HRM and Organizational Culture

Variable	1	2	3	4	5	6	7	8	9
Firm size	0.09	0.08	0.03	0.03	0.01	0.03	0.02	0.02	0.02
Firm age	0.07	0.09	0.07	0.06	0.02	0.00	0.00	0.01	0.01
Part-time ratio	0.10†	0.10+	0.10†	0.10	0.15*	0.15*	0.15*	0.15	0.15*
Female ratio	-0.17**	-0.17**	-0.16**	-0.15*	-0.20**	-0.19**	-0.20**	-0.20**	-0.21**
Unionization	-0.01	-0.01	-0.01	-0.01	0.08	0.08	0.08	0.07	0.07
White color ratio	-0.02	-0.02	-0.01	-0.00	-0.02	-0.02	-0.01	-0.01	-0.02
Strategy	0.10†	0.10+	0.10	0.10	0.12†	0.12†	0.11	0.12	0.12†
Demand change	0.07	0.07	0.06	0.06	0.18**	0.17**	0.17**	0.18**	0.18**
Workforce aging		-0.03	-0.02	0.00	-0.13†	-0.11	-0.10	-0.12†	-0.12†
HRM									
PFP practices			0.04	0.06					
PFP ratio			0.11+	0.12*					
Salary peak			-0.01	-0.01					
Organizational culture									
Adhocracy					0.15	0.12	0.11	0.13	0.15
Market					0.00	-0.03	-0.00	0.01	-0.01
Clan					-0.10	-0.10	-0.09	-0.09	-0.11
Hierarchy					0.09	0.10	0.08	0.08	0.09
Two-way interaction									
Workforce aging x PFP practices				0.04					
Workforce aging x PFP ratio				-0.01					
Workforce aging x Adhocracy						0.18**			
Workforce aging x Market							0.12†		
Workforce aging x Clan								0.06	
Workforce aging x Hierarchy									0.05
R2	0.08	0.08	0.10	0.10	0.10	0.13	0.11	0.10	0.10
∆R2	0.09	0.00	0.01	0.00	0.02	0.03	0.01	0.00	0.00
F for ∆R2	3.53**	0.18	1.36	0.56	1.35	6.77**	3.24†	0.79	0.58

[a] n=229; [b] logarithm; † p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

When I introduce the percentage of employees aged 40 years or older as the independent variable for profit performance, workforce aging is not significantly associated with firm profit performance, although the direction is negative (β = -.11, p > .05 in Table 4 (Age 40 cutoff), β = -.03, p > .05 in Table 5 (Age 50 cutoff)). In both cases, the positive association of workforce aging and sales performance disappears when I change the dependent variable to profit performance, consistent with my prediction. Thus, Hypothesis 1 is supported.

To test the moderation effects of Performance-based pay system and organizational cultures, I conducted moderated regression analyses following the procedure suggested by Aiken and West (1991). In this approach, the main effect variables are centered by subtracting the mean value of each variable from the observed values. Then, the interaction variables are created by multiplying the two centered variables. The resulting interaction term has relatively low correlations with the main effect variables, preventing the potential multicollinearity problem. Moreover, I assessed whether the multicollinearity problem exists by examining the variance inflation factor (VIF) values. The VIF values of my models, including the interaction term, were less than 2, far lower than the conventional threshold value of 10 suggested by Neter, Kutner, Nachtsheim, and Wasserman (1996).

Hypothesis 2 posits that performance-based pay system

moderates the relationship between workforce aging and firm performance. Table 2, 3, 4, and 5 show that performance-based pay ratio is positively related with both types of firm performance, but does not moderate the relationship between workforce aging and any type of performance. On the other hand, the interaction term between the percentage of employees aged 50 years or older and the number of performance-based pay practices is positively and significantly related with firm sales performance ($\beta = .12$, $p < .05$).

In Hypotheses 3 and 4, I theorize that the relationships between workforce aging and firm performances are moderated by organizational cultures, especially adhocracy cultures and market cultures. Table 2 shows the moderation effect of organizational cultures on the relationship between the percentage of employees aged 40 years or older and sales performance. Table 3 describes the moderation effect on the relationship between the percentage of employees aged 50 years or older and sales performance. As indicated Table 2, any interaction term comprised of workforce aging and organizational cultures was not significantly associated with firm sales performance. The results of Table 3 are similar; no interaction effect of organizational cultures exits when the percentage of employees aged 50 years or older is introduced as the independent variable.

Conversely, several interaction terms between the percentage

of employees aged 40 years or older and organizational cultures are positively significant when the dependent variable is profit performance (Table 4). Specifically, the interaction term involving the percentage of employees older than age 40 and adhocracy cultures is significantly related to firm profitability in the hypothesized direction ($\beta = .17$, $p < .01$). When I introduce the percentage of employees aged 50 years or older as the independent variable (Table 5), the results show an analogous pattern, and the interaction effect of adhocracy cultures is significantly positive ($\beta = .18$, $p < .01$). Model 7 in Table 4 shows the results of the interaction term involving the percentage of employees aged 40 years or older and market cultures, indicating the significant moderation effect of market cultures ($\beta = .13$, $p < .05$). However, the interaction term composed of the percentage of employees aged 50 years or older and market cultures is not significantly related with profit performance, but in the hypothesized direction ($\beta = .12$, $p < .10$). Consistent with my prediction, all interaction terms, including group cultures and hierarchy cultures, are not significant.

I plotted the interaction effects following the process suggested by Aiken and West (1991). Figure 1 shows the two-way interaction effect of the percentage of employees aged 50 years or older and the number of performance-based pay practices. The positive relationship between workforce aging and firm sales performance is

FIGURE 1

Moderation of Performance-based Pay

FIGURE 2a

Moderation of Adhocracy Culture (Age 40)

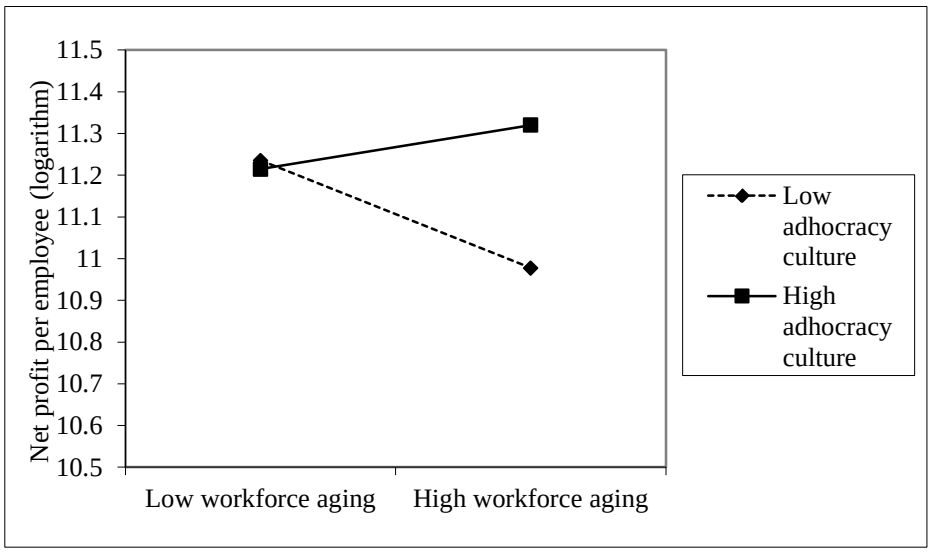
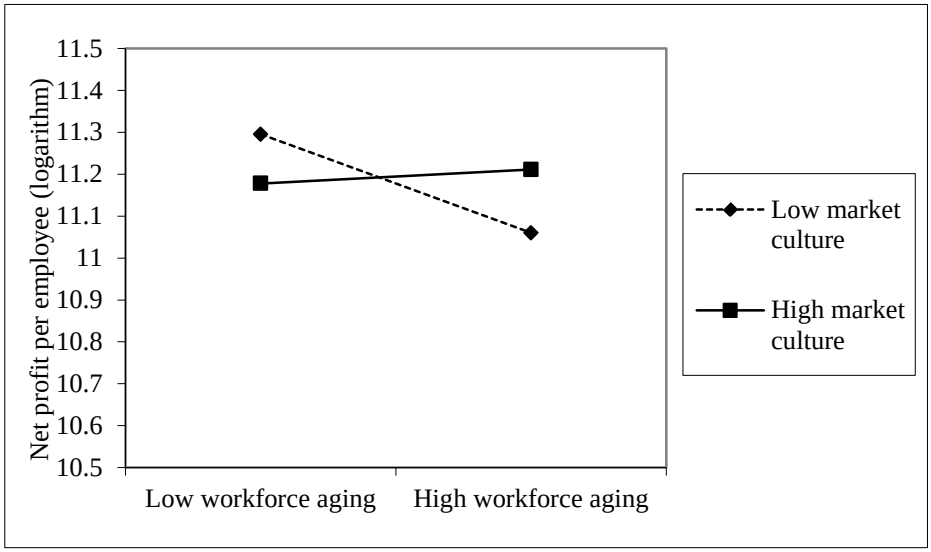


FIGURE 2b

Moderation of Adhocracy Culture (Age 50)

FIGURE 3

Moderation of Market culture (Age 40)



strengthen as the number of performance-based pay practices increases. Thus, Hypothesis 2 is partially supported.

Figure 2a and 2b show the moderating effects of adhocracy culture on firm profit performance. Figure 2a and 2b support that the negative relationship between workforce aging and firm profit performance is weakened as the level of adhocracy cultures increases. Figure 3 shows that the negative relationship between workforce aging (only for Age 40 cutoff) and firm profitability languishes with the increase in the level of market cultures. Adhocracy cultures and market cultures moderate the relationship between workforce aging and firm profitability in the hypothesized direction. Therefore, the results support Hypotheses 3 and 4.

In sum, the results indicate that workforce aging is more positively associated with sales performance of non-high-technology firms than high-technology firms. Moreover, workforce aging is positively related to sales performance, but it loses its significant effect when firm profitability is used as the outcome. In terms of moderating effects of performance-based pay system, only the number of performance-based pay practices positively moderates the relationship between the percentage of employees aged 50 years or older and firm sales performance. Consistent with my prediction, externally oriented organizational cultures (i.e., adhocracy cultures and market cultures)

influence the extent of the relationship between workforce aging and firm profitability.

V. DISCUSSION

In this study, I empirically examined the model of workforce aging and firm performance at the organizational level. On the basis of human capital theory and socioemotional selectivity theory, I examined workforce aging from various angles in terms of older employees' ability, motivation, and opportunities. Then, I hypothesized and found support for complex relationships between workforce aging and firm performance. In particular, I verified that workforce aging is positively related with firm sales performance, whereas there is no relationship between workforce aging and firm profit performance. I also identified performance-based pay system and organizational cultures as the moderating factors of the relationship between workforce aging and firm performances. Specifically, the number of performance-based pay practices moderates the relationship between workforce aging and firm sales performance. On the other hand, two types of externally oriented cultures, adhocracy cultures and market cultures, moderate the relationship between workforce aging and profit performance. The negative relationship is relatively weak when adhocracy cultures or market cultures are formed in the firm. However, organizational

cultures do not moderate the association between workforce aging and sales performance.

This study advances our understanding of the effect of workforce aging on performance in several ways. First, I examined the effect of workforce aging at the organizational level. To date, most of the existing research on workforce aging has concentrated on individual aging and performance. The measurement of individual performance (e.g., supervisor rating and self-reporting) has the potential to cause bias, which can be one of the major reasons for mixed results, as suggested by previous research. Even existing organizational-level studies on workforce aging mostly focused on top management teams and investigated the relationship between demographic characteristics of top management teams and organizational outcomes. These studies may limit our understanding of the effects of company-wide workforce aging on organizational outcomes. Thus, I used the percentage of older employees as an indicator of workforce aging and verified the meaningful relationship between company-wide workforce aging and firm performance. I used the percentage of older employees in this study because my interest is on the effect of workforce aging when the population of older employees increases in a firm. However, other indicators for company-wide workforce aging, such as mean age of a firm, can be used in future studies. The implied meaning of average age

is different from that of the percentage of older employees; average age is more focused on the whole change in organizational demography, that is, the whole pattern of increasing older employees and decreasing younger employees. Therefore, the results may be different depending on the indicator of workforce aging. Moreover, examining the workforce aging effect using various indicators can extend our understanding of organizational workforce aging.

Second, I identified two types of organizational performances (i.e. sales performance and profit performance) as the outcomes of my model to explain the different effects of workforce aging on each firm performance in different industries. The multiple aspects of age may obscure the relationship between workforce aging and firm performance when performance is conceived as a one-dimensional construct. I propose that the relationship between workforce aging and firm performance can be analyzed from various theoretical perspectives. Human capital theory, socioemotional selectivity theory, and social capital perspective can explain the different aging effects on organizations outcomes, depending on what is considered as firm performance. Specifically, this study verified that advantages of workforce aging are magnified in non-high-technology firms, whereas there is no merit of workforce aging in high-technology industries. Moreover, workforce aging is positively associated with sales

performance as older employees have a high level of job experiences, intrinsic motivations, favorable job attitudes, and efficient advice networks. Conversely, profit performance is negatively affected by workforce aging because the costs of workforce aging outweigh the benefits due to older employees' lower cognitive abilities, learning motivations, and higher labor costs. Future research may build on this perspective and empirically test the relationship between workforce aging and other types of organizational outcome. For example, company-wide workforce aging may have a negative effect on new product innovation and technology development as employees' fluid intelligence and learning abilities are the key to these performances. Regarding patent, workforce aging may be negatively related to the number of all applied patents but positively related to the ratio of patent acquirement.

Third, I identified the moderating factors of the relationship between workforce aging and firm performance. I suggest that performance-based pay system positively moderates the relationship between workforce aging and firm performance. The results suggest that the relationship between workforce aging and firm sales performance is moderated by the number of performance-based pay practices. The ratio of performance-based pay only has direct and positive effects on firm sales and profit performance.

On the basis of competing value framework, I also propose and empirically support that externally oriented cultures moderate the relationship between workforce aging and profit performance. Specifically, the negative relationship between workforce aging and profit performance is attenuated when strong adhocracy cultures or market cultures are formed in the firm. On the one hand, the results of the moderating effects can support my theoretical arguments on the negative effect of workforce aging on profit performance despite the positive association between workforce aging and sales performance. On the other hand, by identifying the positive role of organizational cultures, I propose that there are ways to overcome the negative effect of workforce aging on profit performance.

Although this study has many theoretical and practical merits, it is not free from limitations. First, I only used cross-sectional analysis to examine my model because of the limitations on data availability and the characteristics of my model. For effective longitudinal analysis, the values of the measured variables should be changed over time. If not, the estimation can be unstable and may cause serious bias in estimation. In fact, the independent variable of my model, the percentage of older employees in a firm, was almost consistently maintained in the survey period. Thus, I concluded that cross-sectional analysis is appropriate to analyze my theoretical model and data. However, too much dependence

on cross-sectional study can bring up another problem of bias caused by an unobserved time-invariant effect, such as the management philosophy of each corporation. Therefore, if data allow, future research should examine the effect of workforce aging with longitudinal data and analysis.

Similarly, I only used short-term performance, a one-year interval between the measures of the independent variable and the dependent variables, as the outcome. Theory infers that the effect of workforce aging on short-term performance will be different with that on long-term performance. The positive effect of workforce aging on firm productivity may diminish in the long term. Moreover, workforce aging may have different effects on various organizational outcomes. Therefore, I suggest that verifying the relationships between workforce aging and various organizational outcomes can expand our understanding on the effects of workforce aging on organizational outcomes.

Moreover, note that only manufacturing firms were sampled in my empirical study to rule out the specific effect of industry. However, the characteristics of industries can be an important contextual factor to understand the effect of workforce aging. For example, the positive effect of workforce aging can be more prominent in professional firms, such as law firms, because older lawyers have their own know-how and

customer network, which can lead to the high performance of the their firm. Conversely, older employees are not suitable for rapidly changing jobs such as information technology service because older employees are considered slow to learn new technology. Therefore, further studies need to examine the effect of workforce aging in more diverse industries.

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요약 (국문초록)

조직 고령화가 조직성과에 미치는 영향: 인적자원관리와 조직문화의 조절효과를 중심으로

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전 세계적으로 고령화 사회로의 진입이 급속도로 심화됨에 따라 기업의 조직고령화가 주요 이슈가 되고 있으며, 학계에서도 많은 관심을 받아왔다. 그러나 고령화에 대한 연구는 대부분 개인 수준에서 개인의 연령과 개인 수준의 행동 및 성과 간 관계를 밝히는 데 집중되어 있으며, 조직수준에서 조직 고령화와 기업성과 간의 관계를 밝히는 연구는 매우 제한적이다. 이에 본 연구는 조직수준에서 고령화와 성과의 관계를 검증하였다. 인적자본이론, 사회 정서적 선택이론, 사회적 자본 관점을 바탕으로, 고령 근로자의 능력, 동기부여, 기회가 각각 조직성과에 어떤 영향을 끼칠 수 있는지

검토하였으며, 이를 바탕으로 조직 고령화가 조직의 생산성과는 긍정적 관계, 조직의 수익성과는 부정적 관계에 있음을 가설 설정하였다. 또한, 성과기반 보상시스템과 조직문화를 조직고령화와 조직성과 간의 관계를 조절할 수 있는 상황변수로 가정하였다. 인적자본기업패널 2011년도 조사자료를 활용, 229개 제조기업을 대상으로 실증적 분석을 진행한 결과 조직 고령화가 기업 생산성과는 긍정적인 관계가 있으나 수익성에는 유의미한 영향이 없음을 확인하였다. 상황변수의 조절효과와 관련해서는, 먼저, 성과급 제도수는 조직고령화와 생산성 간의 관계를 유의미하게 조절하는 것으로 나타났다. 또한, 외부지향성 문화인 발전문화와 합리문화가 조직고령화와 기업 수익성 간의 부정적 관계를 완화할 수 있음을 보였다.

주요어: 조직고령화, 기업성과, 성과기반보상시스템, 조직문화
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